CLAIMS

1. A method of screening for a substance which modulates binding of an FHA domain to a phosphopeptide, including:

(a) bringing an FHA domain into contact with a phosphopeptide in the presence of one or more test substances;

(b) determining binding of the FHA domain to the phosphopeptide.

2. A screening or assay method for identifying an FHA domain which binds to a phosphopeptide of interest, or for determining the binding of an FHA domain to a phosphopeptide of interest including;

(a) bringing a test FHA domain into contact with said phosphopeptide; and

(b) determining binding of the test FHA domain to the phosphopeptide.

3. An FHA domain identified by the method of claim 2, which binds to a phosphorylated polypeptide comprising the amino acid sequence -Thr(P)-X_1-X_2-Asp-, wherein Thr(P) denotes a phosphorylated threonine residue, and X_1 and X_2 each represent any amino acid residue.

4. An FHA domain according to claim 3 comprising an amino acid sequence which shares at least 50% homology with the

amino acid sequence of the FHA1 domain of *S. cerevisiae* Rad53p.

5. A screening or assay method for identifying a phosphopeptide which binds to an FHA domain, or for determining the binding of a phosphopeptide to an FHA domain including:

(a) bringing a test phosphopeptide into contact with an FHA domain; and

(b) determining binding of the test phosphopeptide to the FHA domain.

6. A phosphopeptide identified by a method according to claim 5 which binds to an FHA domain.

7. A phosphopeptide according to claim 6 comprising the amino acid sequence -Thr(P)-X_1-X_2-Asp- wherein Thr(P) denotes a phosphorylated threonine residue, and X_1 and X_2 each represent any amino acid residue.

8. A phosphopeptide according to claim 6 or claim 7 which binds to the FHA1 domain of Rad53p and/or to Chk2.

9. A phosphopeptide according to any one of claims 6 to 8 comprising the amino acid sequence of a peptide shown in Figure 2.

10. An isolated nucleic acid molecule encoding an FHA domain

according to claim 3 or claim 4 or a phosphopeptide according to any one of claims 6 to 9.

11. A vector comprising a nucleic acid sequence according to claim 10 operably linked to one or more control sequences.

12. A host cell comprising a vector according to claim 11.

13. A transgenic animal comprising a host cell according to claim 12.

14. A method according to any one of claim 1, claim 2 or claim 5 wherein one or more of the phosphopeptide, FHA domain and test substance is in a test sample.

15. A method according to claim 14 including quantifying the amount of phosphopeptide, FHA domain or test substance in the sample.

16. A method according to any one of claim 1, claim 2 or claim 5 including purifying and/or isolating a test substance and/or substance of interest from a mixture or extract.

17. A method according to any one of claim 1, claim 2 or claim 5 comprising labelling one of said FHA domain and said phosphopeptide with a detectable label, immobilising the other of the FHA domain and the phosphopeptide on a solid support and bringing the the FHA domain and the

phosphopeptide into contact.

18. A method according to any one of claims 1, 2, 5 and 14 to 17 wherein the end-point of the assay is phosphorylation of Rad53p protein.

19. A method of producing an phosphopeptide according to any one of claims 6 to 9 comprising expressing nucleic acid encoding the unphosphorylated peptide and phosphorylating the expression product.

20. A substance identified by the method of claim 1 which modulates the binding of an FHA domain to a target phosphopeptide.

21. A substance according to claim 20 comprising an antibody, single chain antibody or fragment thereof directed to the site of binding in either the FHA domain or the phosphopeptide.

22. A substance according to claim 21 wherein said antibody, single chain antibody or fragment thereof is directed at the FHA domain at positions corresponding to Arg-70 and His-88 of Rad53p.

23. A substance according to claim 21 wherein said antibody, single chain antibody or fragment thereof is directed at the motif -Thr(P)-X_1-X_2-Asp-, wherein Thr(P) denotes a

phosphorylated threonine residue, and X_1 and X_2 each represent any amino acid residue.

24. The use of an FHA domain in screening or searching for, and/or obtaining or identifying, a phosphopeptide which binds to said FHA domain.

25. The use of a phosphopeptide according to any one of claims 6 to 9 in screening or searching for, and/or obtaining or identifying, an FHA domain which binds to said phosphopeptide.

26. A method of purifying a protein or polypeptide comprising an FHA domain able to bind a phosphopeptide, the method including contacting material containing the polypeptide with a phosphopeptide.

27. A method of purifying a phosphopeptide, the method including contacting material containing the phosphopeptide with a protein or polypeptide comprising an FHA domain.

28. Use of a phosphopeptide which binds to an FHA domain in a method of designing a peptidyl or non-peptidyl mimetic of the phosphopeptide, which mimetic binds to an FHA domain and/or modulates interaction between an FHA domain and the phosphopeptide.

29. Use according to claim 28 wherein the phosphopeptide

comprises the amino acid sequence of a peptide shown in Figure 2.

30. Use of an FHA domain in a method of designing a peptide or non-peptidyl mimetic of an FHA1-like domain, which mimetic binds to a phosphopeptide.

31. A method of designing a mimetic of a phosphopeptide which has the biological activity of binding to an FHA domain, or a method of designing a mimetic of an FHA domain which has biological activity of binding to a target phosphopeptide, said method comprising:

(a) analysing a substance having the biological activity to determine the amino acid residues essential and important for the activity to define a pharmacophore; and,

(b) modelling the pharmacophore to design and/or screen candidate mimetics having the biological activity.

32. A mimetic obtained by a method of claim 31.

33. The use of a phosphopeptide according to any one of claims 6 to 9, an FHA domain or fragment thereof according to claim 3 or claim 4 or a substance according to any one of claims 21 to 23, in the manufacture of a medicament for the treatment of a condition associated with a defect or disorder in transcriptional control, DNA replication, DNA repair, cell

cycle control or other cellular process mediated by the binding of an FHA domain to a phosphopeptide.

34. The use of a phosphopeptide according to any one of claims 6 to 9, an FHA domain or fragment thereof according to claim 3 or claim 4 or a substance according to any one of claims 21 to 23, in the manufacture of a medicament for anti-pathogen treatment.

35. A pharmaceutical composition comprising one or more of; an FHA domain according to claim 3 or claim 4, a phosphopeptide according to any one of claims 6 to 9, and a substance according to any one of claims 21 to 23.

36. A method of treatment of a medical condition associated with a defect or disorder in transcriptional control, DNA replication, DNA repair, cell cycle control or other cellular process, said method comprising; administering a composition according to claim 35.

37. A method of treatment of a pathogen infection in an individual, the method comprising; administering a composition according to claim 35 to the individual.